Draft Work Plan for "non-Particle Physics" Section of Fermilab Long Range Plan

Preamble -- Issues

Fermilab's core competencies are in the construction and operation of accelerators; the construction and operation of experimental detectors to learn about elementary particles; and in the computing and data analysis techniques required to analyze the data generated by the accelerator and its experiments. In carrying out its mission, Fermilab has developed a wide range of talents and skills that are applicable elsewhere in science and technology. In the past, Fermilab has focused its attention on its core accelerator and particle physics mission. However, it has occasionally committed to other enterprises. A case in point is the Neutron Therapy Facility, which has treated cancer patients for many years.

As we consider Fermilab's future, we must ask whether these "non-particle physics" activities should be expanded. One possible benefit would be that it would provide a more diverse portfolio of projects that might permit us to attract innovative scientists with multidisciplinary outlooks. This might bring us into closer contact with other communities of scientists and might introduce us to new ideas and new ways of attacking some of our problems. A second possible benefit is that it might permit us to contribute to the solution of problems that are of more immediate interest to society than ones we are working on in our "pure" research. This might help us convince the public that support for our work brings immediate benefits as well as the long term benefits from fundamental research. The downside of such activity is that it can divert efforts from our core mission.

We are assuming in our discussions that Fermilab is determined to retain its focus on accelerator –based particle physics and that the program we consider must, therefore, be of limited scope. We are not considering an extensive diversification of the lab's mission or movement to a multi-program lab. However, we will consider areas where Fermilab core competencies overlap or complement those of a non-particle physics area and where benefits, even if somewhat indirect, can accrue to the laboratory, the user community, and the DOE.

Goals

The goals of this working group are therefore

1. to express clearly the advantages to Fermilab, the user community, and the DOE of limited of involvement in areas that are not particle physics;
2. to discuss and define criteria and decision mechanisms that can be used to determine what projects Fermilab should be involved in. This should include

discussions of how closely the projects should conform to our existing set of skills, how closely they should relate to the core part of the program, etc.;
3. to discuss how to evaluate the benefits and costs of a particular program to Fermilab, the user community, and DOE;
4. to identify an initial group of outstanding projects that can be pursued and can be used as test cases;
5. to propose an ongoing method for identifying new projects;
6. to discuss how to fit these projects into the overall program so that they can provide maximum benefit to the lab, the user community, and the DOE as a whole; and
7. to describe mechanisms by which the progress of such projects can be tracked and the costs and benefits assessed to decide whether to continue projects, to terminate them, to spin them off, etc.

Initial Project Areas

We have identified the following project areas for initial consideration:

- Computational Physics
- Computer Science
- Uses of existing machines
- Possible uses of a future linear accelerator (low energy built for the proton source)
- Medical Physics/Therapy
- Biophysics
- others

Our work plan would try to answer each of the questions posed above and would explore each of the project areas identified above and any others that are identified during our study. In all cases, we should take advantage of existing studies and strategies being developed by funding agencies, the commercial sector, and the academic community. We should recruit experts from the university community to advise us on possible areas of interest. As part of identifying projects, we need to have a clear view of what Fermilab's core competencies are and the creation of that list will be part of our work.

The write-up will consist of 1) summaries of the discussion of goals 1-7 and our list of core competencies along with our conclusions and recommendations and 2) discussions of each of the specific projects that we consider along with suggestions of which ones to pursue and how to proceed.